

Clements, Rickey

From: Beshears, Ron D. [Ronald.D.Beshears@msfc.nasa.gov]
Sent: Tuesday, August 06, 2002 9:36 PM
To: 'mike.suits@msfc.nasa.gov'; 'rickey.clements@msfc.nasa.gov';
'ron.beshears@msfc.nasa.gov'; 'robert.thom@msfc.nasa.gov'
Subject: Memo of record, SSME flow liner NDE recommendations

ED32 members met with the USA/JSC/KSC NDE community on August 6th to finalize plans for NDE inspection of welds on the shuttle flow liner end-to-end simulator and on the actual OV-104 vehicle. The USA NDE plan for radiography was largely adapted from the one I prepared last week, but deviated in the matter of acceptable film density. My recommendation, based on ASTM E1742, was that film densities of 1.5 to 4.0 inclusive shall be acceptable. This practice was adhered to during ED32's development of radiographic inspection techniques for approximately 150 evaluation and qualification welds, which were in compliance with ASTM E1742. The USA plan specified an acceptable film density range of 2.0 to 4.0 inclusive. ~~This range is typical of other flight programs (SLWT and SSME turbine hardware, for example), and is widely reflected in various industry specifications, including our own internal OIs. The intent of ASNT in allowing the wider 1.5-4.0 range in 1742 was to allow radiographers some additional latitude in developing techniques for unconventional weld configurations, such as that for the flow liners (reinforcement thicknesses of 50% to 100% of parent metal thickness are very uncommon, and are extremely challenging from the standpoint of developing practical inspection techniques).~~

Mr. Clements and I recommended changing the USA plan to allow a range of densities from 1.5 to 4.0, in compliance with ASTM E1742, for the following reasons:

- (1) ASTM E1742 is the governing document for the USA inspection plan (radiography section only).
- (2) Our experience during inspection of approximately 150 qualification and evaluation welds was that (a) the extra latitude facilitated a more efficient inspection and (b) radiographic indications, particularly fine cracks at the radius of the slot, were occasionally more easily detected in radiographs in the 1.5-2.0 density range than in radiographs at darker (but in-spec) densities.

JSC Quality and Boeing NDE representatives objected to this recommendation, and Richard Russell, the USA M&P engineer acting as leader for the project NDE effort, elected to accept the document as written (2.0-4.0 density range) rather than accept ED32's recommendation. The purpose of this memo is to document that decision for future reference.